**5E Planning Guide for Inquiry Teaching!**

**Academic Language:**

* Fossil
* Paleontologist
* Era
* Classify
* Predict

**Procedural Language:**

* Describe
* Create
* Discuss
* Assist
* Observations

**Your Name:** Heidi Taviano  **Unit Name:**  Fossils **Lesson Name:** How and Why Scientists Study Fossils

**Learner outcomes: (content and inquiry – measurable). The students will:**

* Infer characteristics about a mystery object by making observations and recording their findings.
* Communicate their findings and ideas with others in the classroom and support their beliefs with 90 percent accuracy.
* Create a tool using new knowledge and skills that will assist a scientist with discovering a fossil in a new area.

**Grade Level Standards, Grade, Theme, & Topic**

*Standard (highlight one):* Earth Life Physical

*Grade:* 4th Grade

*Grade Band Theme:* Interconnections within Systems

*Topic:* Earth’s Living History

**Condensed Content Statements**

* Fossils can be compared to one another and to present-day organisms according to their similarities and differences.

**Science Inquiry and Application**

* Communicate about observations, investigations and explanations.
* Review and ask questions about the observations and explanations of others.
* Observe and ask questions about the natural environment.

**Common Misconceptions**

* Students may believe if organisms look alike, then they must have a common evolutionary history.

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| **5-E Phase** | **Planned Activity/Event** | **Guiding Questions** | **Notes: Materials, Safety, Modifications** |
| **Engage Time: 45 min**   * Tap prior knowledge * Focus learner’s thinking * Spark interest in topic | * First, read students a scenario about a scientist making a new discovery, but he cannot determine what the object is. Therefore, he needs their help. * Have students group in pairs of two. Give them each a ‘mystery bag’, which contain a brachiopod fossil. * Have them create drawings and make inferences. * Pull objects out of the bag and introduce the new topic of study: fossils. * Read a book and watch a video about fossils | * What does the object feel like? * How heavy is it? * What do you think the object looks like? * Is the object similar to another object you have seen before? * What other characteristics can you describe? * Why do you think scientists study fossils? * How do you think scientists study fossils? | * Materials: brown paper bags, brachiopod fossil, scientist scenario, handout, fossil book, fossil video * Safety/Rules: do not taste the ‘mystery object’, do not swing your bags around or shake them * Modifications: if students are struggling to make a hypothesis about the object, give them a clue about what the fossil might be: (this object is something that scientists use to discover information about the Earth; this object is usually found in the ground and dug up by scientists) |
| **Explore Time: 30 min**   * Provide learners with common, concrete, tactile experiences with skills and concepts * Observe and listen to students * Ask probing questions * Act as a consultant | * Now that students have pulled the objects out of the bag, have them make new observations and drawings of the brachiopods by completing another handout. * During this time, the teacher will work with two students at a time and have the make an hypothesis about a dinosaur fossil. | * How do you think the fossil was created? * What questions might a scientist ask? * How do you think the fossil was found? What tools do you think the scientists used? * Describe the color, texture, and size of the fossil. * What organism do you think this fossil was made from? * Why would a scientist be interested in studying this type of fossil? | * Materials: brachiopod fossils, dinosaur rib fossil, handout, extra reading material, microscopes * Safety/Rules: do not put the fossils in your mouth, do not throw or toss the fossils in the air * Modifications: have advanced students lead their own discussion about the dinosaur fossils, while other students are provided with guided questions. Also, provide students struggling with the material with prompting questions, while they complete their handout about the brachiopods. Students who complete handout early will be provided with material to read about fossils. |
| **Explain Time: 35 min**   * Encourage students to explain concepts in their own words * Ask for justification * Use students previous experiences as the basis or explaining concepts * Clarify and correct misconceptions | * Have students present their findings. * Pre-read text for homework (76-79) * Read pages 76-79 in textbook. * Have students complete guided notes. | * How did you explore the fossils? * How might what you did compare to what a paleontologist does? * Why do paleontologists study fossils in this way? * Do only non-living (biotic) organisms become fossils? | * Materials: Textbook (Science, Houghton Mifflin, (2007)), guided notes, graphic organizers * Safety/Rules: students should be reminded to remain in their seats and to respect others ideas * Modifications: provide IEP students with typed notes and a partially completed graphic organizer. |
| **Extend Time: 20 min**   * Apply same concepts and skills in a new context resulting in deeper and broader understanding * Encourage the students to apply the concepts/skills to new situations | * Give students a scenario about paleontologist studying fossils. (They are seeing landforms and animals they have never seen.) * Have the students complete a handout, which will involve creating a tool and answering questions. | * What kind of tool should the paleontologist use to assist him? * What kind of questions should this scientist ask about his new discoveries? * What characteristics of the fossils should the scientists look at? | * Materials: scenario, handout, coloring tools * Safety/Rules: remain in seats, unless given permission to get up, and respect others ideas * Modifications: Provide pictures of tools to struggling students so they can use these for inspiration to create their own tools. |
| **Evaluate Time: 5 min**   * Observe as students apply new concepts and skills * Assess, formally and/or informally student progress toward achieving the learner outcomes * Assess students’ knowledge and/or skills * Allow students to assess their own learning and group process skills | * Have the students complete a quick-write to end the lesson. | * How and why do scientists study fossils? * What did you like about this lesson? * What did you not like about this lesson? | * Materials: quick-write handout * Safety/Rules: remain in seats, unless given permission to get up, and respect others ideas * Modifications: Allow struggling writers to first describe their thoughts to you, and then encourage and assist them to write their thoughts down on paper. |